CIRCUIT DESCRIPTION
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STEP-BY-STEP SYSTEM
PRIMARY MASTER SWITCH CIRCUIT
MODIFIED TO REDUCE DOUBLE CONNECTIONS

DEVELOPMENT

1. PURPOSE OF CIRCUIT

1.1 This circuit provides means of associating a subscriber's line circuit with an idle trunk to the switches beyond.

1.2 It provides means for operating the traffic registers associated with the primary line switchboards.

1.3 It removes the battery for the pull down windings of other line switches after one has plunged as soon as possible to reduce double connections.

2. WORKING LIMITS

2.1 None.

OPERATION

3. FUNCTIONS

3.1 To step the line switch plungers to an idle trunk immediately after any line switch plunges in on the trunk previously selected.

3.2 To rotate the shaft so as to pick up all the idle plungers whenever the pick up relay (E) is energized from ground furnished by the secondary relay equipment.

3.3 To prevent the line switches under its control from plunging in on a trunk while the master switch is rotating.

3.4 To cause the peg count, overflow, and all trunks busy registers to operate whenever it is desired to take readings of these traffic conditions.

4. CONNECTING CIRCUITS

4.1 Primary line switch circuit.

4.2 Alarm circuit for primary line switchboards.

4.3 Switch trouble alarm circuit.

4.4 Supervisory circuit.

4.5 Secondary test panel circuit.

4.6 Register circuit.

DETAILED DESCRIPTION

5. LINE SWITCH SEIZED

When the line switch plunges in on a trunk, the corresponding master switch bank contact of the group to which the line switch belongs is grounded from ground at the first selector over the sleeve or when secondary line switches are used the master switch bank contact is grounded from direct ground at the primary line switch holding trunk bank contact or from the contacts of the message register trunk relay when used.

This ground on the master switch bank contact closes a circuit through the corresponding master switch wiper and winding of relay (C). When relay (C) operates, it opens the shunt around resistance "C" so that the "open main" battery to the line switch pull down coils is no longer direct, but is through the resistance "C" which prevents another line switch from plunging, but holds the one already operated. Relay (C) is fast in operating so that the time when two line switches can plunge in on the same trunk is a minimum. Relay (C) also closes a circuit to relay (B) from supervisory ground in the associated alarm circuit. Relay (B) operates and disengages the locking arm from the locking segment and allows the master switch spring to move the line switch shaft and wipers including the locking segment to the next idle trunk. Relay (B) also closes a circuit for relay (D) which operates and opens battery from the "C" resistance and pull down coils of all line switches and also connects battery to the "MS SIG" lead through the alarm circuit.

6. HUNTING AN IDLE TRUNK

The master switch steps from right to left, that is, it selects trunk 10 first, then 9, 8, 7, etc. When the master switch wipers step on to an idle bank contact relay (C)

drops back and opens the circuit to relay (B) allowing it to restore and closes the shunt on resistance "C". This allows the locking arm to reengage the locking segment and lock the line switch plungers opposite the idle trunk. It also opens the circuit to relay (D) allowing it to restore and close "open main" battery.

When the last trunk (#1) is reached, arm #1 of the locking segment partially closes the circuit to relay (A) from supervisory ground. When this trunk becomes busy relay (C) completes the circuit and operates relay (A) which locks itself mechanically and closes the circuit to the solenoid which pulls the line switch shaft, wipers, and the locking segment to the first position (trunk #10). Relay (A) also closes the circuit to relay (B) in order to hold relay (B) operated until the master switch reaches trunk 10 so as to keep the locking arm disengaged from the locking plate while the solenoid is operating. Relay (B) holding (D) in its operated position in order to hold the "open main" battery open so that no line switch can plunge in on a trunk while the master switch is rotating. As soon as trunk #10 is reached trip arm #10 trips relay (A), allowing it to restore and open the circuit to relay (B) and the solenoid. If trunk #10 is not busy relay (B) on restoring locks the line switch shafts opposite this trunk and opens the circuit to relay (D) allowing it to restore and close the "open main" battery circuit.

7. PICK UP RELAY (E)

The primary line switch plungers on restoring, after being released from a call, remain opposite the trunk last used until picked up by the plunger guide shaft as it is stepped along by the master switch. Consequently it becomes necessary to rotate all the primary master switches whenever all trunks in any of the secondary groups associated with the primary boards become busy in order to prevent any primary line switch from standing opposite a trunk leading to a busy secondary group. Whenever a secondary group becomes busy a momentary ground over the "PU" lead operates relay (E) which locks up under control of relay (A). Relay (E) operates relay (C) which operates relay (B) which allows the primary master switch to rotate to trunk #1 (assuming that the master switch is standing opposite any trunk except trunk #1). When trunk #1 is

reached, arm #1 of the locking plate closes the circuit to relay (A). Relay (A) operates, locks itself mechanically, opens the locking circuit to relay (E) and closes the circuit to relay (B) and the solenoid. Relay (E) due to its slow release action, holds the circuit to relay (A) closed long enough to allow (A) to lock itself mechanically in its operated position. The solenoid pulls the shaft line switch to the first position (trunk #10) in order to pick up all primary line switch plungers not in use.

8. TRAFFIC REGISTRATION

Relay (F) operates in series with the pull down coil of the line switch whenever a call is initiated and causes the operation of peg count meter in the associated register circuit, indicating the number of calls outgoing from the primary line switchboard during the period that peg count readings are being taken. Whenever all trunks are busy relay (D) will remain operated and a calling subscriber will be unable to make a call. Under this condition relay (H) "W" wiring will operate when a subscriber attempts to call closing a circuit to relay (G) or when "Z" wiring is used relay (G) operates directly and after an interval during which its pendulum type armature will come to rest the register in the associated register circuit will be operated to indicate an overflow call. Relay (G) and (H) can also be arranged to register on all trunks busy condition in which case it will operate whenever all trunks become busy from ground on jack 4 even if no call is initiated.

9. SUPERVISORY GROUND RELAY

Ground for the entire master switch circuit is taken through the winding of the supervisory ground relay in the associated alarm circuit so that it will operate whenever the solenoid is energized. The relay is also operated from the contacts of relay (B). The supervisory relay gives an audible and visual signal in case all the trunks are busy or the master switch becomes stuck after a time interval.

10. SPARK PROTECTION

The two condensers "A" and "B" and resistance "A" reduce sparking at the contacts of relay (A) and (C). The condensers "C" and resistance "B" are for the purpose of absorbing the spark at the master switch banks and wipers

in order to increase their life. When this protection is used one of the banks must be opened. Where secondary line switches are used, only the (H) or upper bank is required (X wiring). Where secondary line switches are not used, only the (S) or lower bank is required (Y wiring).

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